PASSF
16.4
10/14/99

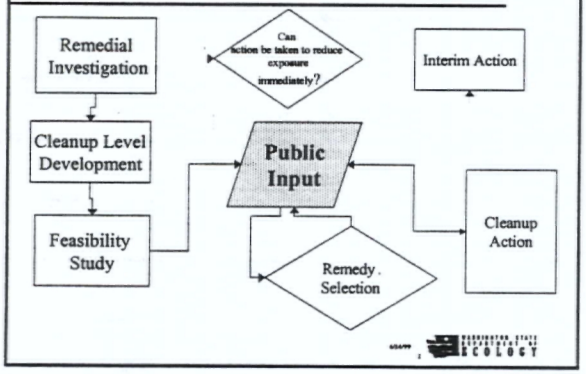
Pasco Sanitary Landfill

Remedial Investigation/Feasibility Study

Public Notice and Comment Period

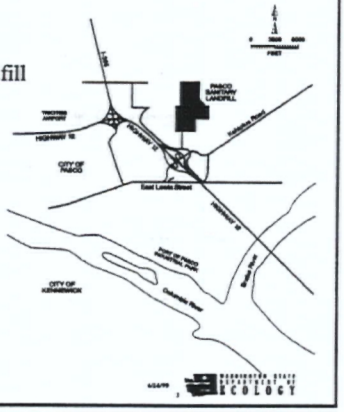
June 15-July 16, 1999

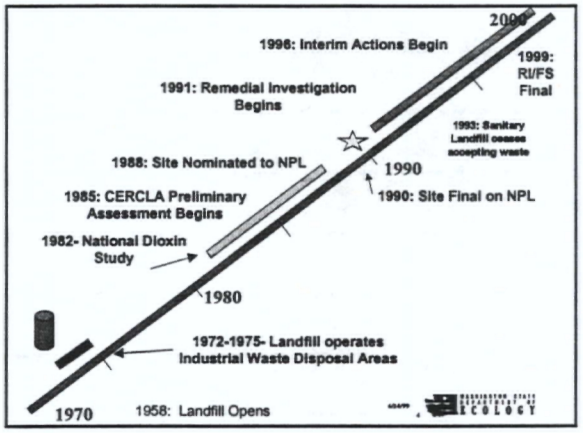
The MTCA Cleanup Process

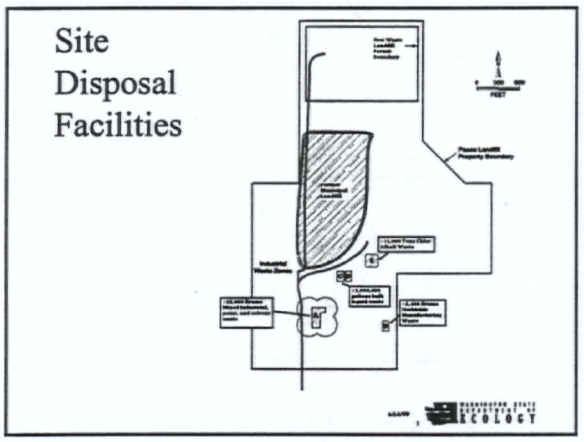


Location-

Pasco Sanitary Landfill



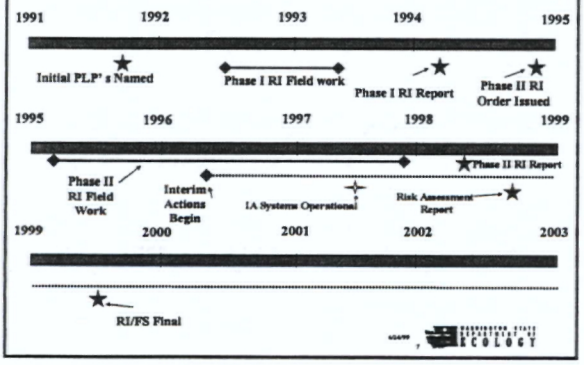




Potentially Liable Persons (PLPs) for Pasco Sanitary Landfill

- Advance Electroplating
- Basin Disposal Company
- Boeing Company
- Philip Environmental Inc.
- Burlington Environmental, Inc.
- Chemical Processors, Inc.
- Resource Recovery, Inc.
- Burlington Northern, Inc.
- Carr Aviation
- Collier Carbon and Chemical
- Chempro of Oregon
- Crown Cork and Seal Company, Inc.
- E.I. du Pont de Nemours and Co., Inc.
- Franklin County
- Freightliner Corporation, a Subsidiary of Daimler-Benz of North American Holding Company
- Georgia-Pacific Corporation
- Glidden Corporation, a Subsidiary of ICI Americas, Inc.
- Harbor Oil, Inc.
- ICI Canada, Inc.
- Intalco Aluminum Corporation
- John and Marjorie Dietrich
- James River Paper Company, Inc.
- Kalama Chemical Company
- Leonard and Glenda Dietrich
- Minnesota Mining and Manufacturing Company
- Morton Chemical Company
- National Service Industries, Inc.
- Pasco Sanitary Landfill, Inc.
- Franklin Land Recovery, Inc.
- Puget Sound Naval Shipyards
- The O'Brien Corporation
- Oregon Cutting Systems Division of Blount, Inc.
- PACCAR, Inc.
- Precision Castparts Corporation
- Pluto Energy and Transportation Company
- PPG Industries
- Rhone-Poulenc Company
- Sandvik Special Metals
- Simpson Timber Company
- UARCO Incorporated
- United States Air Force
- United States Department of Agriculture,Forest Service
- United States Department of Interior, Bureau of Reclamation
- Weyerhaeuser Corporation
- Wood Treatment Chemical Company

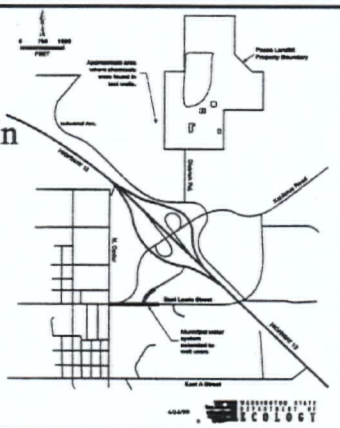
Site Investigation Timeline



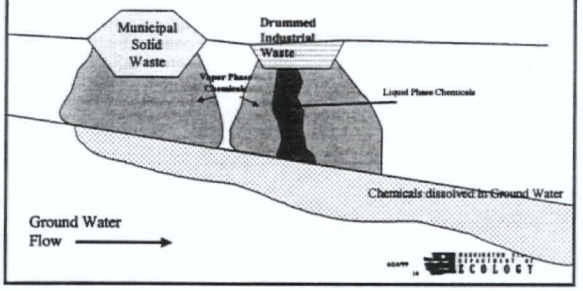
Remedial Investigation Results 1991-1999

- Volatile Organic Chemicals are found released from Zone A, the Municipal Landfill, and potentially other sources at the site to ground water.
- Volatile Organic Chemicals are found in soil gas beneath Zone A.
- No significant areas of soil contamination exist outside the waste zones.

Extent of Chemicals in Ground Water



What's Happening Here?
"Conceptual Site Model"

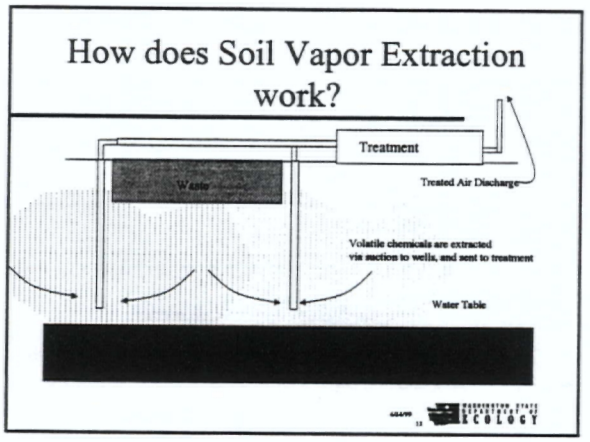


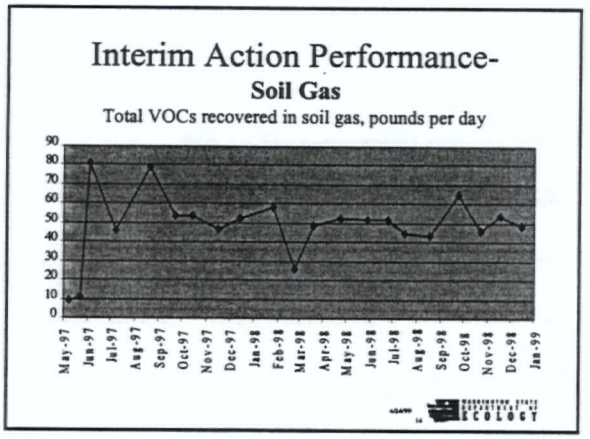
Interim Actions 1996-1997

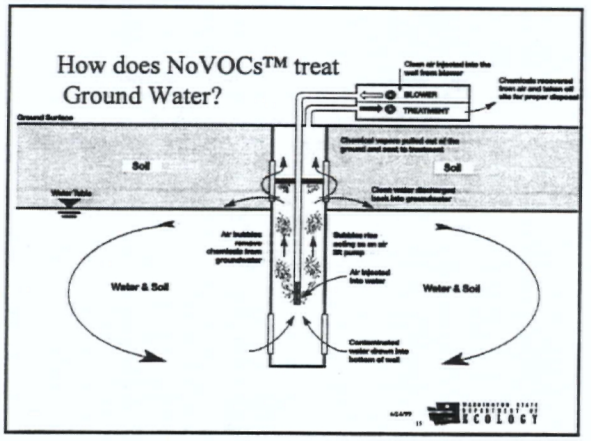
- Provide Drinking Water for Affected Residents
- Install Soil Vapor Extraction around Zone A
  - Capture VOCs before they reach Ground Water
- Install NoVOCs™ next to Zone A
  - Treat VOCs and other chemical in Ground Water

Water Hookups-1997

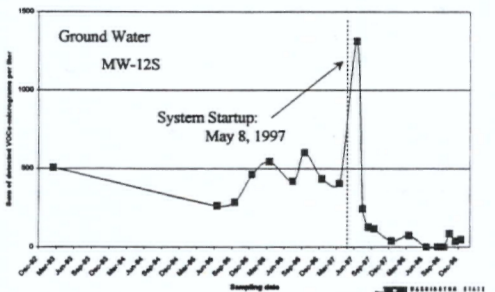
Area of City Water Extension. Water extension, installation and monthly costs paid by PLPs


How does Soil Vapor Extraction work?
Treatment
Waste
Treated Air Discharge
Volatile chemicals are extracted via suction to wells, and sent to treatment
Water Table
ECOLOGY


Interim Action Performance-
Soil Gas
Total VOCs recovered in soil gas, pounds per day
90
80
70
60
50
40
30
20
10
0
May-97
Jun-97
Jul-97
Aug-97
Sep-97
Oct-97
Nov-97
Dec-97
Jan-98
Feb-98
Mar-98
Apr-98
May-98
Jun-98
Jul-98
Aug-98
Sep-98
Oct-98
Nov-98
Dec-98
Jan-99
ECOLOGY


How does NoVOCs™ treat Ground Water?
BLOWER
TREATMENT
Soil
Soil
Water & Soil
Water & Soil
ECOLOGY

Interim Action Performance- Ground Water



Cleanup Levels Development Risk Assessment Results 1998

- Industrial use of property and residential ground water use are the most reasonable exposure assumptions
- Soils beneath waste zones are assumed to exceed regulatory values for ground water protection
- Cleanup levels are proposed for:
  - 13 VOCs and 1 metal in ground water
  - 1 VOC in soil

Chemicals of Concern

- Reasonable Maximum Exposure:
  - *Ground Water*
    - **Residential ingestion**
  - assumes constant exposure to drinking or showering by an adult
  - *Soil:*
    - **Industrial Worker**
  - Daily, 8 hour exposure to chemicals in soil by an adult

- Metals
  - Chromium
- VOCs
  - Acetone (Soil and Ground Water)
  - Benzene
  - 1,2-Dichloroethene
  - 1,1-Dichloroethene
  - cis 1-2 Dichloroethene
  - Trans 1-2-Dichloroethene
  - Tetrachloroethene
  - Toluene
  - 1,1,1-Trichloroethane
  - 1,1,2-Trichloroethane
  - Trichloroethene
  - Vinyl chloride

Feasibility Study - 1999

- Reviews:
  - Contamination to be remediated
  - Concentrations considered "clean"
- Establishes:
  - Applicable Local, State, and Federal Laws
  - Remedial Action Objectives
- Evaluates technologies
- Proposes a Solution

Remedial Action Objectives

What must the Remedial Action accomplish?

- Prevent direct exposure to waste and chemically-contaminated soil
- Prevent releases to air, soil, and water
- Prevent ingestion, inhalation, and dermal adsorption of chemicals in ground water
- Minimize transport of chemicals from disposal zones to air, soil, and water

Feasibility Study Conclusions

- Only containment or removal technologies were applicable to Industrial Waste Zones.
- Closure in accordance with EPA guidance applicable to former Solid Waste Landfill
- Performance of NoVOCs™ warranted use as preferred ground water treatment technology
- Institutional Controls could be effective at minimizing exposure and risk.

Ground Water Alternatives

- Continued Ground Water Monitoring and Institutional Controls
- Minor Expansion of on-property NoVOCs™
  - 1 Well Expansion near Zone A only
- Major Expansion of on-property NoVOCs™
  - 20 Well Expansion to include Municipal Solid Waste area
- Treatment of Entire Plume
  - 200 Well Expansion to include entire occurrence of chemicals in Ground Water

Alternatives, Costs, and Time-to-Cleanup

Ground Water

Alternative GW-1 • Monitor Ground Water • Provide Alternate Water Supply • Institutional Controls	• NoVOCs™Treatment of Zone A • Alternative GW-1 •	• NoVOCs™ Treatment of Zone A and Solid Waste Landfill • Alternative GW-1	• NoVOCs™ Treatment of Off-site Plume • Alternative GW-1
$5,400,000	$8,600,000	$25,000,000	$79,000,000
Several Tens of years	Tens of years	Tens of years	Less than 10 years

Solid Waste Landfill

• Install and Maintain a Solid Waste Landfill Cover and Active Gas Extraction System • Institutional Controls
$2,000,000 - $7,000,000
1 year

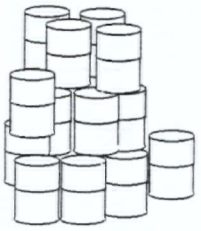
Industrial Waste Zone Alternatives

Is the waste to be **removed** to secure disposal and treatment, or **contained** and monitored in its present location?

Removal Alternatives

- Excavation with on-site disposal of residual solids:
  - Wastes removed to a modern, lined facility built on the property
- Excavation with off-site disposal
  - Wastes removed to a permitted Treatment and Disposal Facility
- Excavation of wastes only, or wastes and contaminated soils

How would Drum Excavation work?



- Drums would be:
  - exposed by machinery
  - inspected for content and integrity
  - overpacked and sampled
  - labeled, inventoried, and staged for transport and disposal

Concerns During Removal

- Worker Exposure to Hazardous Substances
- Releases of Hazardous Substances to Air
- Releases of Hazardous Substances to Soil and Ground Water
- Construction site and community safety

All Possible Removal Actions must address these problems!!

How would Wastes Be Disposed?

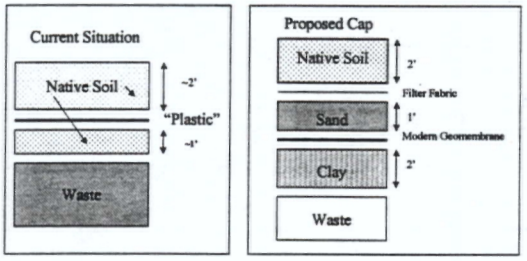
- Off-Site Option
  - Once secured, wastes would be transferred to out-of-area treatment facility for treatment in accordance with Federal rules
- Soils may be left on site and contained.
- On-Site Option
  - Free-liquids removed off site. Solids in wastes would be deposited in a chemical waste landfill, built on-property.
- Soils may be left on site and treated or contained.

Containment Alternatives Common Elements

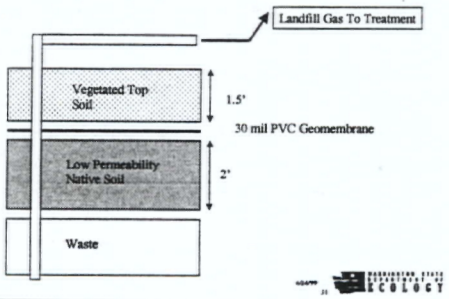
- **Institutional Controls**
  - **Fencing and deed restrictions on former disposal cells**
  - **Ground Water extraction restrictions on plume properties**
  - **Water provided to residential well users**
- **Continued operation and expansion of NoVOCs™ and Soil Vapor Extraction System**

Containment Alternatives- Cap Cross Sections

Industrial Waste Zones



Solid Waste Landfill Cap Cross Section



Drum Cell Alternatives, Costs, and Time-to-Cleanup

Zone A

• Maintain Existing Cap • Expand SVE • Implement Institutional Controls	• Construct Zone A Cap • Expand SVE • Implement Institutional Controls	• Remove Drums, Off-Site Incineration • Cap and treat remaining soils	• Remove Drums and Soil for Off-Site Incineration • Implement Institutional Controls	• Drum and Soil Removal, On-Site Disposal • Implement Institutional Controls
$6,000,000	$6,000,000	$60,000,000	$182,000,000	$37,000,000
10's to 100's of years	10's to 100's of years	10's of years	5 years	5 years

Zone B

• Maintain Existing Cap • Implement Institutional Controls	• Construct Zone B Cap • Implement Institutional Controls	• Construct Zone B Cap • Construct Subsurface Barriers • Implement Institutional Controls	• Drum Removal and Off-Site Incineration • Cap Remaining Soils • Implement Institutional Controls	• Drum and Soil Removal and Off-Site Incineration • Implement Institutional Controls	• Drum and Soil Removal to On-Site Lined Cell • Implement Institutional Controls
$41,000	$122,000	$1,300,000	$7,400,000	$11,700,000	$4,600,000
1-5 years	1-5 years	2 years	3 years	3.5 years	3.5 years

Bulk Cell Alternatives, Costs, and Time-to-Cleanup

Zone C and D

• Maintain Existing Cap • Implement Institutional Controls	• Construct Zone C and D Cap • Implement Institutional Controls	• Construct Zone C and D Cap • Install Soil Vapor Extraction • Implement Institutional Controls	• Remove Waste with Off-Site Disposal • Install Soil Vapor Extraction • Implement Institutional Controls	• Remove Waste and Dispose On-site • Install SVE System • Implement Institutional Controls
$46,000	$208,000	$1,100,000	$5,700,000	$1,600,000
1 year	1 year	5 years	5 years	5 years

Zone E

• Maintain Existing Cap • Implement Institutional Controls	• Construct Zone E Cap • Implement Institutional Controls	• Waste Removal to Off-Site Disposal • Implement Institutional Controls	• Waste Removal and On-Site Disposal • Implement Institutional Controls
$46,000	$240,000	$2,600,000	$1,200,000
< 1 year	< 1 year	1 year	1 year

Pasco PLP Preferred Alternative

- Interim Action:
  - Cap All Zones
  - Expand Soil Vapor Extraction
  - Expand NoVOCs™ System
  - Ground Water Monitoring
  - Institutional Controls

Elements of the PLP Proposal